

WHAT IS CLAIMED IS:

1. A method of optimizing signal transformation from a twisted
5 pair transmission line to a combination transmitter and receiver
for a frame-based communications network, the transmitter having
a transmit output pair port for transmitting signals onto the
frame-based communications network over the twisted pair
10 transmission line, the receiver having a receive input pair port
for receiving signals from the frame-based communications network
over the twisted pair transmission line, comprising:

coupling a transformer between the twisted pair transmission
line and each of the transmit output pair port and the receive
input pair port, the transformer having a coil across the twisted
15 pair, a transmit coil across the transmit output pair port, and
a receive coil across the receive input pair port, wherein a
transfer ratio between the transmit coil and the coil across the
twisted pair is optimized for transmitting signals and a transfer
ratio between the receive coil and the coil across the twisted
20 pair is optimized for receiving signals.

2. The method of Claim 1, wherein the transfer ratio between
the transmit coil and the coil across the twisted pair and the
transfer ratio between the receive coil and the coil across the
25 twisted pair are optimized by optimizing transmit coil to coil
across the twisted pair turns ratio and receive coil to coil
across the twisted pair turns ratio to maximize respective
transmit path and receive path signal to noise ratios.

3. The method of Claim 1, wherein the twisted pair transmission
30 line is a telephone line having a tip line and a ring line.

4. The method of Claim 1, wherein the transmit coil to coil
across the twisted pair turns ratio is designated wt:1 and the
35 receive coil to coil across the twisted pair turns ratio is

designated wr:1, such that a wr:wt ratio includes the range from 1 to 4.

5. A transformer apparatus for optimizing signal transformation from a twisted pair transmission line to a combination transmitter and receiver for a frame-based communications network, the transmitter having a transmit output pair port for transmitting signals onto the frame-based communications network over the twisted pair transmission line, the receiver having a receive input pair port for receiving signals from the frame-based communications network over the twisted pair transmission line, comprising:

a plurality of transformer coils coupled between the twisted pair transmission line and each of the transmit output pair port and the receive input pair port, the plurality of transformer coils including a coil across the twisted pair, a transmit coil across the transmit output pair port, and a receive coil across the receive input pair port, wherein a transfer ratio between the transmit coil and the coil across the twisted pair is optimized for transmitting signals and a transfer ratio between the receive coil and the coil across the twisted pair is optimized for receiving signals.

6. The transformer apparatus of Claim 5, wherein the transfer ratio between the transmit coil and the coil across the twisted pair and the transfer ratio between the receive coil and the coil across the twisted pair are optimized by optimizing transmit coil to coil across the twisted pair turns ratio and receive coil to coil across the twisted pair turns ratio to maximize respective transmit path and receive path signal to noise ratios.

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7. The transformer apparatus of Claim 5, wherein the twisted
pair transmission line is a telephone line having a tip line and
5 a ring line.

8. The transformer apparatus of Claim 5, wherein the transmit
coil to coil across the twisted pair turns ratio is designated
wt:1 and the receive coil to coil across the twisted pair turns
10 ratio is designated wr:1, such that a wr:wt ratio includes the
range from 1 to 4.

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